DARK ENERGY SURVEY

Our plan to submit an “Official Proposal” for The Dark Energy Survey to the NSF and DOE

A presentation to the

DES working group

John Peoples November 3, 2006

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Outline of the presentation

- The Official Proposal in NSF style
- The mandatory content of an NSF style proposal
- The purposes of the Official Proposal
- An NSF style format for the Official Proposal
- An outline for an NSF style project description
- The plan to draft the Official Proposal

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The Official Proposal Content

October 18 message requests an “Official”
NSF style proposal
What does that mean?

- The proposal must be submitted in FastLane
  This dictates the format!
- All proposals will be reviewed utilizing the two merit review criteria (NSF 04-23):
  - (1) the intellectual merit of the proposed activity; and
  - (2) the broader impacts resulting from the proposed activity.

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Intellectual Merit

- Project Description must include the objectives for the period of the proposed work and expected significance.
  - The science case must be of the highest intellectual merit!
- It should outline the general plan of work, including the broad design of activities to be undertaken, and
  - where appropriate, provide a clear description of the experimental methods and procedures and
  - plans for preservation, documentation, and sharing of data… and other related research and education products.

A justification for requiring the public release of the DES data

Broader Impacts

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- The Project Description must describe as an integral part of the narrative, the broader impacts resulting from the proposed activities, addressing one more of the following as appropriate for the project:
  - (1) how the project will integrate research and education by advancing discovery and understanding while at the same time promote teaching, training, and learning;
  - (2) ways in which the proposed activity will broaden the participation of underrepresented groups:
  - (3) how the results of the project will enhance infrastructure for research and/or education, such as facilities, instrumentation, networks, and partnerships; and potential benefits to society at large."

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Purpose of the proposal

- It is a vehicle for DOE and NSF to evaluate the entire DES experiment from end-to-end: concept to publication.
- DOE and NSF will evaluate the scientific merit of the proposal as a Stage III proposal in the light of the DETF report. (If possible we must do better than we did for P5!)
- The NSF will treat it as a funding request for the DES Data Management System development at NCSA

  (J. Mohr, project leader).
- DOE will use it as part of the material for its CD-1 review, currently scheduled for February 20. It does not replace the CD-1 documentation.

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NSF Style Format

- A. Cover sheet
- B. Project Summary
- C. Table of Contents
- D. Project Description
- E. References Cited
- F. Biographical sketches
- G. Budget
- H. Current and pending support
- I. Facilities, Equipment and Other Resources
- J. Special Information/ Supplementary Documentation

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The Project Description

The outline of the description of the DES experiment: End-to-End or life cycle costs

- 1. Background and introduction to contents of the DES experiment (J. Peoples & D. Tucker; 5 p)
- 2. The science case for DES (J. Frieman coordinator; 25 p)
- 3. DECam Project (B. Flaugher; 15 p)
- 4. DES Data Management System Project (J. Mohr; 10 p)
- 5. The Integration of DECam with the Blanco (A. Walker & BF; 5 p)
- 6. Commissioning of the entire DES System (Proposal team; 4 p)
- 7. DES operations (Proposal team; 3 p)
- 8. DES science activities throughout the life of the DES (TBD; 2 p)
- 9. The DES Experiment end-to-end costs (TJS) and conclusion (JP; 5p)

One survey - three projects: D 1

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The Collaboration proposes to build and commission three projects as single survey system to achieved its scientific goals:

- Fermilab leads the construction of the DECam project
- NCSA/UIUC leads the development of the DES Data Management System
- NOAO/CTIO leads the integration of DECam with the Blanco, including the telescope and observatory improvements.

Each lead institution has extensive experience in the project that it leads. All participants plan to engage in the science and contribute to the deliverables

The DECam Project: D 3

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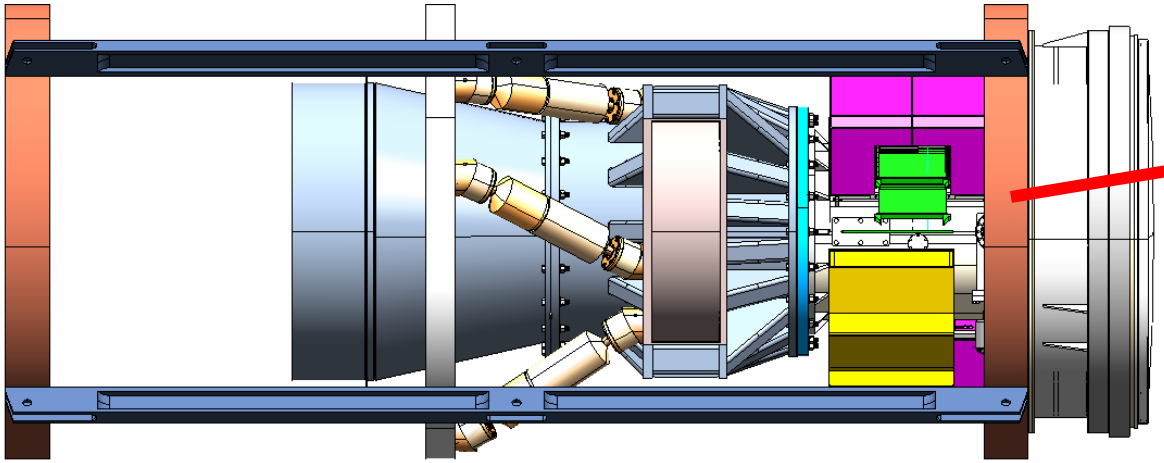
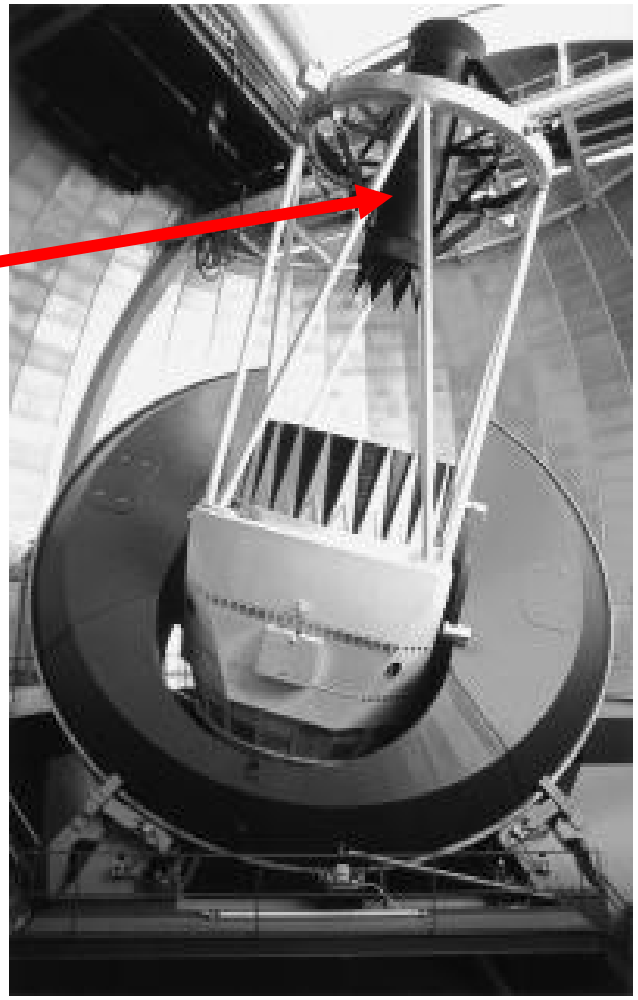
DECam will replace the prime focus cage





DECam Project Structure

1.1 Management
1.2 Focal Plane Detectors
1.3 Front End Electronics
1.4 Optics
1.5 Opto-Mechanics
1.6 Survey Image Processing System (SISPI)
1.7 Survey Planning
1.8 CTIO Integration

The DECam Project Deliverables

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- The DECam project will deliver to NCSA:
  - Simulation data sets for the data challenges
- The DECam project will deliver to CTIO:
  - Completed camera vessel
  - Assembled and tested focal plane of 62 image, 8 alignment/focus and 4 guide CCDs
  - Assembled and tested optical corrector
  - Assembled and tested primary cage with associated alignment and cooling systems
  - Assembled and tested readout electronics system
  - Assembled and tested auxiliary systems (sky camera, cloud camera)
  - Completed and tested software and hardware for SISPI

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DES Data Management Project : D 4

- The DES Data Management System builds:
  - Processing pipelines with built in QA testing
  - A distributed archive to support automated data processing and calibration within a grid computing environment
  - A catalog archive database to support science analyses
  - Web portals for control, monitoring and scientific analyses
  - Hardware platforms at NCSA required for science operations
- During the build phase DES DM
  - processes simulated data, delivered by the DECam project, as an integral part of the build and test cycles of the data challenges

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DES at CTIO

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Integration of DECam with the Blanco Telescope: D 5

- The Blanco telescope and site seeing capability
- NOAO/CTIO will provide:
  - The Blanco telescope
  - An upgraded telescope control system
  - Infrastructure improvements at CTIO to support DECam operations and maintenance
  - Leadership of the reassembly, installation and integration of DECam with the Blanco
- Fermilab, Michigan, Spain, UCL and UIUC will provide:
  - Engineering and tech support during the installation and final hardware tests

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DES Commissioning: D 6

- Commissioning consists of all the activities from the completion of the three projects until operations can be scheduled.
- Commissioning begins when the three projects are completed and their sub-system tests are complete.
- Commissioning ends when several nights of survey quality imaging data has been obtained with DECam, transported to NCSA by NOAO DPP DTS and reduced by DES DM at NCSA.
- DECam operations with the Blanco can be scheduled by CTIO when commissioning ends.

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DES Operations, D 7, & DES Science Activities, D8

- DES operations includes all of the activities that are needed to create the raw data for DES, transport it on the NOAO DPP DTS to NCSA, process and archive the data with the DES DM system and use the processed data for science analyses. These are activities carried out by the professional staff
- DES Science Activities include everything that scientists do throughout the life of the DES. These are funded by the base or core science program.

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DES Experiment end-to-end costs: D 9

- This sections rolls up all level 2 costs by funding source contained in sub-sections D 3 through D 8 and provides level 1 cost by funding source. The level 1 costs are contained in a single table. A total end-to-end cost may be provided by summing the level 1 costs.
- The summed level 1 costs provide the end-to-end costs of the DES experiment from concept to publication as requested by the October 18 message from R. Staffin and W. Van Citters

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Key elements of the NOAO Announcement of Opportunity

- A partnership opportunity to develop a major new instrument for the Blanco telescope
  - A special opportunity to exploit the wide field capability of the prime focus
- Up to 30% of the Blanco telescope for 5 years commencing on 2007 or 2008 for the science project.
- NOAO will contribute the operation of the telescope and an upgraded control system. The partner will contribute the instrument to NOAO which will schedule it for the community use during the remaining 70% of the time.
- NOAO would expect to partner with the successful proposer in developing a data management system, which is compatible with the National Virtual Observatory (NVO).

Project Description (cont'd)

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The other mandatory elements of the project description

- 10. The relationship of DES to other surveys (TBD; 5 p)
- 11. Broader Impacts (J Peoples, coordinator; 10 p)
  - The DES science archive when made public has a broader impact on the astronomical community
  - The community archive of DECam data obtained by other users through the community use of DECam has a broader impact on the astronomical community

than the scientific results of DES alone

- 12. Results from Prior NSF Support (TBD; 0.5 p)

NOAO expectations for the DES Project

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- US astronomical community access to a major new instrument that can exploit the still powerful capabilities of the Blanco.
  - DECam will be a community instrument. A majority of the remaining time on the Blanco after accounting for the time allocated to DES could be awarded to peer reviewed proposals from the astronomical community.
- US astronomical community access to the public archive created from the data obtained with DECam.
  - NOAO plans to place the DECam data and the processed data in a public, NVO compatible archive, under its stewardship.
- NOAO has prepared a Community Needs Document to help define the scope of DECam and the DESDM from the community perspective.
- The cost of fulfilling these expectations is not part of the DES experiment. It is included in the cost of Broader Expectations.

DES Data Management Project : Its Broader Impact

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- DESDM project will deliver to NOAO DPP
  - A processing pipeline that remove instrument signature with built in QA testing suitable for integration into E2E
  - The documentation for the pipelines
  - Support to integrate the pipelines into E2E and commission their operation
- During operations DES will deliver the raw data NSA through the NOAO Data Transport System and NOAO will publish the archived data for community use after the proprietary period ends.

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NOAO Operations
NOAO/DPP

- NOAO/DPP will provide its E2E Data Management System to all users of DECam to receive, process and distribute DECam data. It consists of:
  - Data capture and transport over NOAO network facilities to La Serena
  - Raw data storage at La Serena and subsequent distribution to other nodes, including NCSA, over NOAO network facilities
  - Archive and access services through the NOAO NVO portal
  - Pipeline processing for the community - *DES must provide a well documented and E2E integrated pipeline to remove DECam instrument signatures for this purpose*
  - Data management infrastructure
- E2E will also serve the processed DES DECam data with the signature removed.

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The Plan to Prepare the Official Proposal

- Develop material for all sections and begin writing sub-sections D 3 to D8 and D 10 & D12 - Nov 15
- Complete draft 1 of cost tables for D 3 to D8 and D11
  - Nov 15
- Obtain cost definition for D 8 from KT & NS - Nov 20
- Reach agreement on the responsiveness of the outline to the 18 Oct message – Nov 20
- Brief three directors on the proposal plan - late Nov
- Assemble first draft of the official proposal – Dec 1
- Submit Official proposal to FastLane – Dec 15

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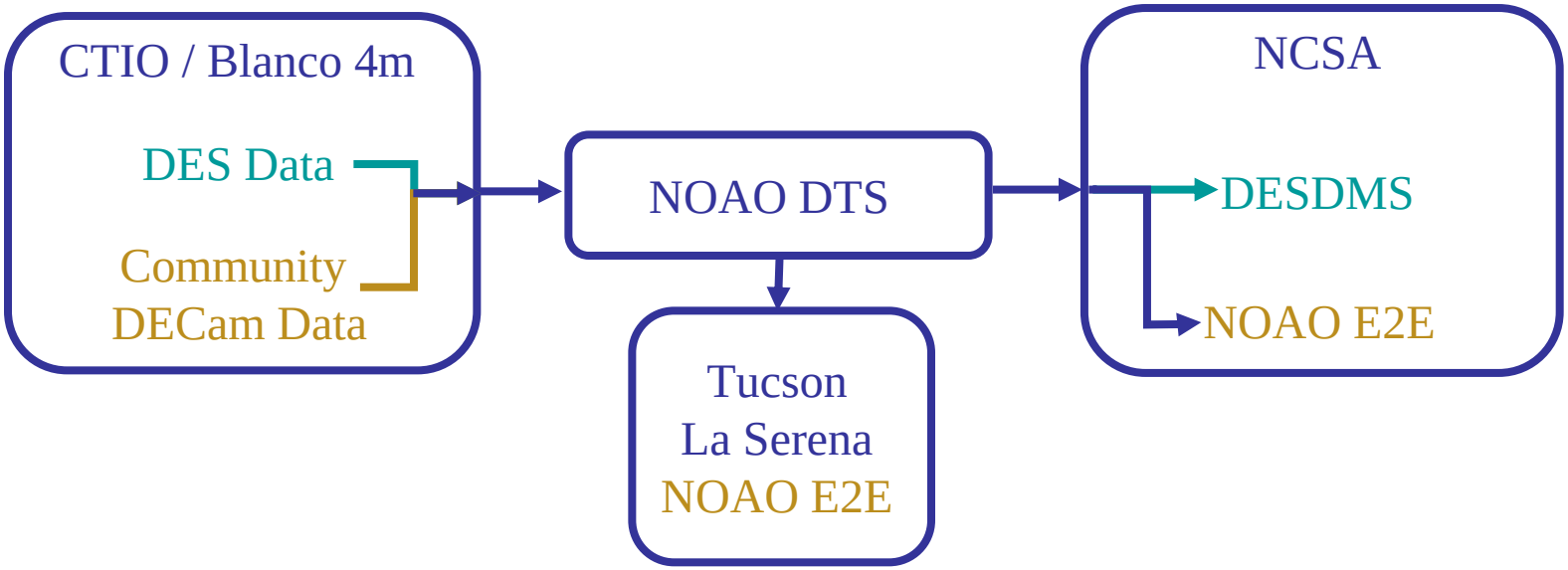
Extra Slides


CTIO / Blanco 4m
DES Data
Community
DECam Data
NOAO DTS
Tucson
La Serena
NOAO E2E
NCSA
DESDMS
NOAO E2E

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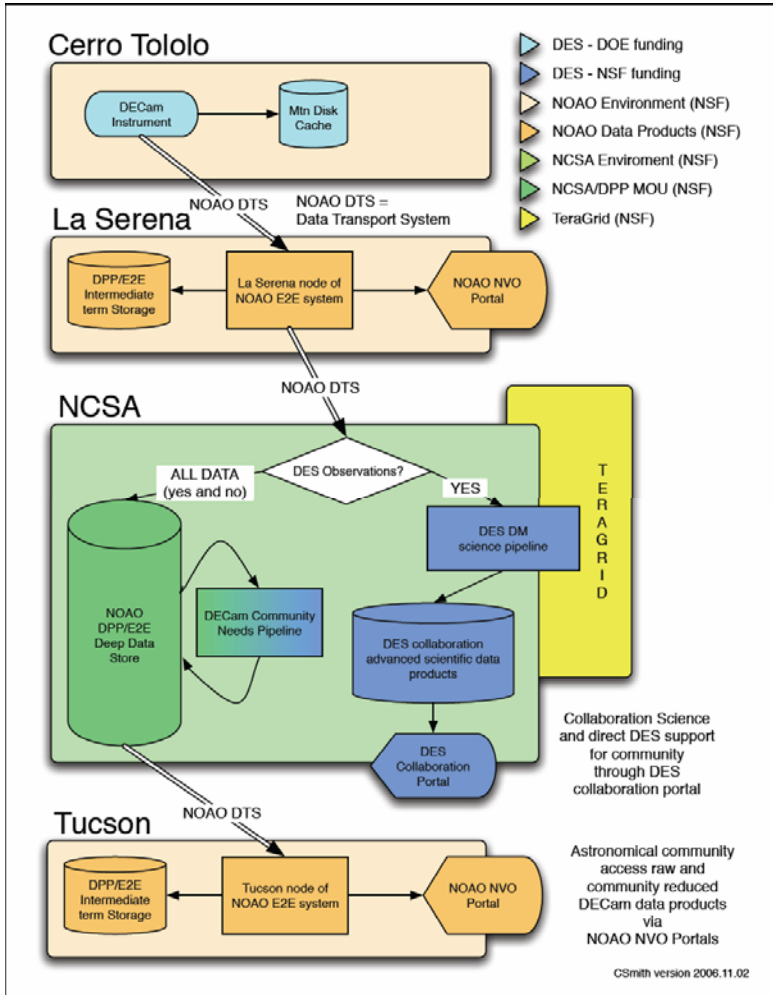
Data Flow



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Oct 18 message from Staffin and Van Citters

- For DES to be considered adequately, we need to get an official proposal that describes the overall experiment end-to-end, including the R&D and fabrication of the camera, data management system, and telescope upgrades as well as a description of the commissioning and operations phases. It should also include:
  - information on the science case and how it will relate to and satisfy the recommendations put forth in the recent Dark Energy Task Force report,
  - scope, technical, cost, schedule and management aspects,
  - costs and plans for the commissioning and operations phases,
  - information on all anticipated funding requests to NSF and DOE to support the R&D, fabrication, integration, commissioning, operations and science activities,
  - expected contributions from NOAO/CTIO operations, NOAO/DPP and any other laboratory contributions, including programmatic deliverables and estimated equivalent cost, and
  - expected contributions from university and foreign partners.
- For such a proposal to be considered in a timely way, it needs to be submitted to DOE and NSF by mid-December in the “NSF-style” proposal format. A waiver on the page limit could be granted. If received, DOE and NSF plan to jointly review its scientific merit and technical feasibility.

Best Regards,
Wayne Van Citters and Robin Staffin

DES Data Management Project requirements from NOAO

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- *The DECam pipeline and delivery of raw and pipeline-processed images into the NOAO Science Archive (NSA) are DES deliverables, along with DECam. In this context, pipeline-processed images refers to images that have been corrected for instrumental signature and astrometrically and photometrically calibrated. The pipeline used for non-DES observations may be a separate pipeline to the actual DES pipeline.*

NOAO must provide the archive equipment into which the DES raw data flow. The cost of that archive, NSA, is not part of the DES experiment cost.

Dark Energy Survey Oversight: a collaboration perspective

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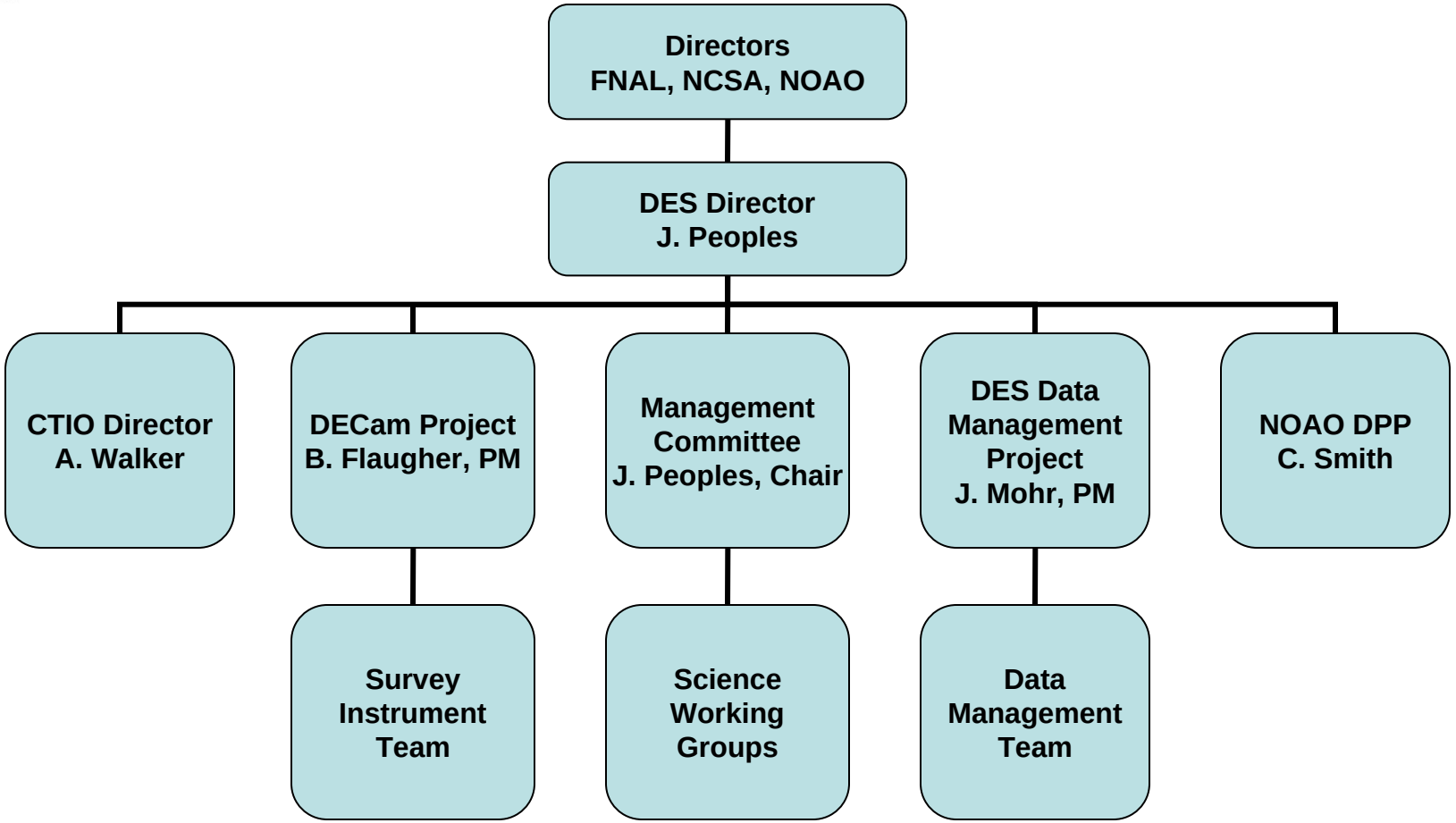

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BIRP recommendations: Sept 2004

- BIRP recommended NOAO to proceed with the partnership, provided that:
  - The camera, the data reduction pipelines and the DES data archive be deliverables.
  - A formal set of written acceptance testing plans and performance metrics be developed.
  - There should be an external oversight committee.
  - DECam should not preclude use of the F/8 focus.
  - Filter changes be should be possible in normal operations and NOAO should supplement the DES *griz* filters.
  - NOAO should commit adequate resources to enable community science.

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Outstanding Issues

- The success of the DESDM project depends on NSF awarding funding to Joe Mohr at UIUC. A proposal submitted a year ago for DESDM was not supported. The NSF program manager indicated that NSF would not fund the proposal if DESDM were part of the required deliverables to NOAO in the MOU and the NSF would not consider the proposal unless he could see everything
  - The partners will remove all support for community Data Management from the MOU if it creates a cost for either NCSA or Fermilab. Work on the MOU has stopped.
  - In the meantime work on Data Challenge 2 is proceeding as planned with NCSA and UIUC support